



# EDSE14005 *Manufacturing*

## Term 2 - 2019

Profile information current as at 22/05/2024 12:55 am

All details in this unit profile for EDSE14005 have been officially approved by CQUniversity and represent a learning partnership between the University and you (our student). The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

### General Information

#### Overview

As a capstone unit to the suite of Industrial Technology and Design (INTAD) units, this unit engages pre-service teachers with their larger role in the agenda of the delivery of integrated Science, Technology, Engineering and Maths (STEM) education. This unit challenges pre-service teachers to engage secondary school students in an interdisciplinary and applied approach which will excite and engage them with real world application and problem solving. The unit brings together the required hand skills and understanding from the preceding INTAD units to develop a program that will inspire young people with a manufacturing interest towards careers that will build our nation. With the support of the Re-Engineering Australia Foundation, this unit seeks to redress the disjointed approach to STEM with a cohesive learning paradigm which combines these strands on a platform of innovation and creativity.

#### Details

Career Level: *Undergraduate*

Unit Level: *Level 4*

Credit Points: 6

Student Contribution Band: 7

Fraction of Full-Time Student Load: 0.125

#### Pre-requisites or Co-requisites

30 credit points (5 units) from the Industrial Technology and Design minor.

Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the [Assessment Policy and Procedure \(Higher Education Coursework\)](#).

#### Offerings For Term 2 - 2019

- Mixed Mode

#### Attendance Requirements

All on-campus students are expected to attend scheduled classes – in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

#### Residential Schools

This unit has a Compulsory Residential School for distance mode students and the details are:

Click here to see your [Residential School Timetable](#).

#### Website

[This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.](#)

## Class and Assessment Overview

### Recommended Student Time Commitment

Each 6-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 hours for the unit.

### Class Timetable

#### [Regional Campuses](#)

Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

#### [Metropolitan Campuses](#)

Adelaide, Brisbane, Melbourne, Perth, Sydney

### Assessment Overview

#### 1. **Practical Assessment**

Weighting: 50%

#### 2. **Portfolio**

Weighting: 50%

### Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the [University's Grades and Results Policy](#) for more details of interim results and final grades.

## CQUniversity Policies

**All University policies are available on the [CQUniversity Policy site](#).**

You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the [CQUniversity Policy site](#).

## Previous Student Feedback

### Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

#### Feedback from Students

##### Feedback

Residential School provided hands on experience and allowed students to use their knowledge and understanding to create their project.

##### Recommendation

Continue to improve content and activities for residential Schools

## Unit Learning Outcomes

**On successful completion of this unit, you will be able to:**

1. Plan and develop a STEM program based on a suite of design and construction activities.
2. Apply skills sequences and procedures using CAD/CAM, virtual modelling techniques and appropriate discipline specific teaching techniques.
3. Apply problem solving, planning, sequencing, implementing and assessing strategies to STEM applications and processes to promote STEM education including the application of innovation.
4. Critically evaluate the design and manufacture of STEM teaching and production processes.
5. Apply appropriate workplace health and safety and maintenance practices when engaging in design and manufacturing activities.

This unit aligns with the following Australian Professional Standards for Teachers (Graduate Career Stage):

##### **Standard 2: Know the content and how to teach it**

2.1 Content and teaching strategies of the teaching area

2.2 Content selection and organisation

##### **Standard 4: Create and maintain supportive and safe learning environments**

4.4 Maintain student safety

##### **Standard 7: Engage professionally with colleagues, parents/carers and the community**

7.2 Comply with legislative, administrative and organisational requirements

## Alignment of Learning Outcomes, Assessment and Graduate Attributes



### Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes				
	1	2	3	4	5
<b>1 - Practical Assessment - 50%</b>	•	•	•	•	•
<b>2 - Portfolio - 50%</b>	•	•	•	•	•

### Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes				
	1	2	3	4	5
1 - Communication	•	•	•	•	•
2 - Problem Solving	•	•	•	•	•
3 - Critical Thinking	•	•	•	•	•
4 - Information Literacy	•	•	•	•	•
5 - Team Work	•	•	•	•	•
6 - Information Technology Competence	•	•	•	•	•
7 - Cross Cultural Competence	•	•	•	•	•
8 - Ethical practice	•	•	•	•	•
9 - Social Innovation					
10 - Aboriginal and Torres Strait Islander Cultures					

## Alignment of Assessment Tasks to Graduate Attributes

Assessment Tasks	Graduate Attributes									
	1	2	3	4	5	6	7	8	9	10
1 - Practical Assessment - 50%	•	•	•	•	•	•	•	•		
2 - Portfolio - 50%	•	•	•	•	•	•	•	•		

## Textbooks and Resources

### Textbooks

**There are no required textbooks.**

### IT Resources

**You will need access to the following IT resources:**

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Note: Students will need to access to the following:
  - Autodesk Inventor Professional
  - Autodesk Flow Design
 Register with your student email on the links below and download the free software  
<https://www.autodesk.com/education/free-software/inventor-professional>  
<https://www.autodesk.com/education/free-software/featured>

## Referencing Style

All submissions for this unit must use the referencing style: [American Psychological Association 6th Edition \(APA 6th edition\)](#)

For further information, see the Assessment Tasks.

## Teaching Contacts

**Brad Connolly** Unit Coordinator

[b.connolly@cqu.edu.au](mailto:b.connolly@cqu.edu.au)

## Schedule

### Week 1 - 15 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
STEM / F1 in Schools / Aerodynamics	Step 1. View the media clips and visit the links to read the notes for the first quiz. Quiz 1 is about STEM and Re-engineering Australia's F1 in Schools Challenge. Step 2. Logon to Moodle and complete Quiz 1. Step 3. View the links and read the notes for the second quiz. Quiz 2 is about the aerodynamics of a car. Step 4. Logon to Moodle and complete Quiz 2. Step 5. Download Autodesk Inventor Professional 2018 and the available Flow Design. Remember to check your computer requirements. Register with your student email on the links below and download the free software. <a href="https://www.autodesk.com/education/free-software/inventor-professional">https://www.autodesk.com/education/free-software/inventor-professional</a> <a href="https://www.autodesk.com/education/free-software/featured">https://www.autodesk.com/education/free-software/featured</a>	<b>Quizzes 1 &amp; 2</b>

### Week 2 - 22 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Technical Rules and Regulations / CNC Machining and Rapid Prototypes	Step 1. Download and view the Technical Regulations and read the notes for the third quiz. Quiz 3 is introduces you to the strict rules and guidelines student must follow when designing the C02 race car. Step 2. Logon to Moodle and complete Quiz 3. Step 3. View the links and read the notes for the forth quiz. Quiz 4 is about the CNC machining and rapid prototypes. Step 4. Logon to Moodle and complete Quiz 4. Step 5. Download Autodesk Inventor Professional 2018 and the available Flow Design. Remember to check your computer requirements. Register with your student email on the links below and download the free software. <a href="https://www.autodesk.com/education/free-software/inventor-professional">https://www.autodesk.com/education/free-software/inventor-professional</a> <a href="https://www.autodesk.com/education/free-software/featured">https://www.autodesk.com/education/free-software/featured</a>	<b>Quizzes 3 &amp; 4</b>

### Week 3 - 29 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
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## Design Criteria / CAD Tutorials 1- 4

Step 1. Read the assessment outlines for Portfolio Assessment 1B and 1C. Step 2. Download the Design Folio template. The design folio has a series of activities for each stage of the design process. Familiarise yourself with the various stages of the design process. Step 3. Complete the Design Criteria stage of the Design Folio. Step 4. Create a folder called CO2CAR. This is where you must save all computer-aided design (CAD) files for this project. Remember always back up your files (CAD work) as the course progresses. Step 5. View and complete Autodesk Inventor tutorial clips 1, 2, 3 and 4. Step 6. Title and save your work into the CO2CAR folder

### Week 4 - 05 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Car Design Ideas	Step 1. Read the assessment outlines for Portfolio Assessment 1C. Step 2. Review the links below on aerodynamics. Step 3. View the links on concept sketching. Step 4. Refer to the Technical Rules and Regulations document. Step 5. Complete the Car Design Ideas stage of the design folio.	

### Week 5 - 12 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
CAD Tutorials 5 - 26	Step 1. View the CAD tutorial clips 5 - 26 and start to create the car model. Step 2. Save all files in the appropriate folder CO2CAR.	

### Vacation Week - 19 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Enjoy your break.		

### Week 6 - 26 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
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Cover Page / CAD Tutorials 5 - 26

Step 1. View the CAD tutorial clips 5 - 26 and continue to create the car model. Step 2. Complete the Cover Page of the design folio (Car Render). Step 3. Save all files in the appropriate folder C02CAR.

#### Week 7 - 02 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Design Development CAD / CAD Tutorials 5 - 26	Step 1. Revise Autodesk Inventor Professional tutorial clips 1- 26 especially tutorial 24 (Editing). Step 2. Refer to your Car Design Ideas from your folio. Step 3. Save as your tutorial car as C02CAR2. Step 4. Modify the C02CAR2 design to incorporate your own design ideas using Autodesk Inventor. Step 4. Take print-screens of your new model as you create it in Inventor. The print-screens should highlight the aerodynamic features explored in the Car Design Ideas stage of the folio. Step 5. Use the print-screens to complete of the Design Development CAD stage of the folio. Step 6. Save all files in the appropriate folder C02CAR.	

#### Week 8 - 09 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Compliance Drawing / CAD Tutorials 21 - 23	Step 1. Revise how to create an Inventor Drawing file by viewing tutorial clips 21 -23. Step 2. Create C02CAR2 Compliance Drawing idw. Step 3 Refer to the Technical Rules and Regulations. Step 4. Annotate Inventor Drawing with dimensions, rules and regulations. Step 5. Complete the Compliance Drawing for the folio. Step 6. Save all files in the appropriate folder C02CAR.	

#### Week 9 - 16 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
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## C02CAR2 Model & Compliance Drawing / Testing and Evaluation / CAD Tutorials 27 - 28

Step 1. Submit the C02CAR2 part file via Moodle from week 7. Step 2. Submit the Compliance Drawing of the C02CAR2 via Moodle from week 8. Step 3. Download and read Introduction to Autodesk Flow Design (PDF). Step 4. View and follow Flow Design tutorial clips 27 & 28. Step 5. Complete the Testing and Evaluation stage of the folio. Step 6. Save all files in the appropriate folder C02CAR. Submit the part and drawing files in the following format:

1. The inventor part file (ipt.) titled Last name\_First name\_C02CAR2 Model
2. The inventor drawing file (idw.) titled Last name\_First name\_C02CAR2 Compliance Drawing

**Portfolio Assessment 1B (C02CAR2 Model)**  
**1. The inventor part file (ipt.) titled Last name\_First name\_C02CAR2Model**  
**2. The inventor drawing file (idw.) titled Last name\_First name\_C02CAR2 Compliance Drawing**

## Week 10 - 23 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Design Folio Exemplar (Assessment Item 1C)	<p>Step 1. Complete the Design Folio Exemplar (Written Assessment 1C). Step 2. Submit Design Folio Exemplar via Moodle. Step 3. Review the Residential School schedule and resources.</p> <p>Submit Design Folio in the following format:            Last name_First name_DesignFolio</p>	<p><b>Submit Design Folio in the following format:</b>  <b>Last name_First name_DesignFolio</b>  <b>Portfolio Due: Week 11</b></p>

## Week 11 - 30 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Residential School - Practical Assessment Items 2A & 2B	<p>There is a three day Compulsory Residential School Monday 30th of September to 2nd October 2019. If required due to high student numbers another will run Thursday 3rd October - Saturday 5th October 2019. You will need to allocate which Res School you wish to attend. Follow the instructions in the document "How to select a Res School".</p> <p><b>Res School will be held at Mackay North State High School</b></p>	<p><b>Practical Assessment 2A Compulsory Residential School</b></p>

## Week 12 - 07 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic
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Manufacturing Logbook  
(Practical Assessment Item  
2B)

Manufacturing Logbook  
(Practical Assessment Item 2B)  
Step 1. Complete the  
Manufacturing Logbook  
(Practical Assessment Item  
2B). Step 2. Submit  
Manufacturing Logbook via  
Moodle.

Submit Manufacturing  
Logbook in the following  
format:  
Last name\_First  
name\_ManufacturingLogbook

**Manufacturing Logbook Practical  
2B is Due: Friday 11.59 Week 12.**

**Practical Assessment -  
Compulsory Residential School:  
Computer Aided Design and  
Manufacture** Due: Week 12 Friday  
(11 Oct 2019) 11:55 pm AEST  
**Portfolio** Due: Week 12 Friday (11  
Oct 2019) 11:55 pm AEST

#### Review/Exam Week - 14 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic
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#### Exam Week - 21 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic
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## Assessment Tasks

### 1 Practical Assessment - Compulsory Residential School: Computer Aided Design and Manufacture

#### Assessment Type

Practical Assessment

#### Task Description

Computer Aided Design and Manufacture

This assessment consists of two parts:

Part A: CO2 Race Car 30%

During the Residential School, you will utilise computer aided design and manufacturing software and equipment to design and make a miniature CO2 gas powered balsa wood car. It is an opportunity to develop an understanding of how technology can be used to make your ideas a reality. Completion of this task will enable you to demonstrate how to create cutting paths, set machine parameters, enter computer code, and operate and maintain a CNC router and 3D printer. Hand tools are applied during the finishing and assembly stages of the course.

The CO2 race car will be assessed on completion during the Residential School. An A4 page of photos of the finished car is to be submitted via Moodle in the following format:

Last name\_First name\_CO2 race Car

Part B: Manufacturing Logbook 20%

During and post Residential School, you are required to produce a manufacturing logbook that documents the creation of the miniature race car. The logbook should describe the aim and objectives of each stage of manufacture, as well as outline relevant challenges, solutions, quality control measures and health & safety issues. The logbook will provide evidence of your work in the form of photos, screen shots, videos and annotations. It must demonstrate an understanding and application of computer aided design and manufacture as well as manual finishing processes. All work is to be collated and presented in the form of a PowerPoint presentation. A template is provided. The Manufacturing

logbook is to be submitted online via the Moodle website in the following format:

Last name\_First name\_Manufacturing Logbook

#### Assessment Due Date

Week 12 Friday (11 Oct 2019) 11:55 pm AEST

#### Return Date to Students

Exam Week Friday (25 Oct 2019)

#### Weighting

50%

## Assessment Criteria

Students will be assessed on the following criteria:

- Ability to produce a quality and well finished product
- Ability to operate CNC Machinery skillfully and safely
- Ability to work autonomously with complex tasks
- Ability to investigate and evaluate the manufacturing process
- Ability to present and communicate work effectively

## Referencing Style

- [American Psychological Association 6th Edition \(APA 6th edition\)](#)

## Submission

Online

## Learning Outcomes Assessed

- Plan and develop a STEM program based on a suite of design and construction activities.
- Apply skills sequences and procedures using CAD/CAM, virtual modelling techniques and appropriate discipline specific teaching techniques.
- Apply problem solving, planning, sequencing, implementing and assessing strategies to STEM applications and processes to promote STEM education including the application of innovation.
- Critically evaluate the design and manufacture of STEM teaching and production processes.
- Apply appropriate workplace health and safety and maintenance practices when engaging in design and manufacturing activities.

## Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- Information Technology Competence
- Cross Cultural Competence
- Ethical practice

# 2 Portfolio

## Assessment Type

Portfolio

## Task Description

Portfolio Assessment: STEM and 3D Computer Aided Design

This Assessment task consists of 3 parts:

Part A: Four Quizzes 10%

The initial study introduces STEM education, F1 in Schools Challenge, Aerodynamics and CNC manufacture.

Four quizzes require you to instigate the four topics on selected readings and media provided and online.

Questions will be available on the Moodle website each Monday and remain open until the following Monday at midnight. Students have a maximum of 60 minutes per quiz. You are allowed two attempts for each quiz.

Quizzes are due in Weeks 2 and 3

Part B - Computer Aided Design (CAD) Car Model 15%

You are required to utilize computer aided design (CAD) software, and computational fluid dynamics (CFD) software to model and test a car design. By following the CAD tutorials provided you will be shown how to create and modify a basic race car suitable for side machining using Autodesk Inventor.

To complete this task, you will need to download the CAD software 'Autodesk Inventor Professional' and 'Autodesk Flow Design' from the Autodesk Education Community website. Use your student email to first register and then download the necessary software.

<http://www.autodesk.com/education/free-software/all>

CAD Car model is to be submitted online via the course Moodle website in two parts.

1. The inventor part file (ipt.) titled

Last name\_First name \_C02CAR2 Model

2. The inventor drawing file (idw.) titled

Last name\_First name\_C02CAR Compliance Drawing

Part C - Design Folio Exemplar 25%

Scenario:

As a teacher at a secondary school and you have been asked to run an after school club. The principal has specified it should be STEM based activity and suggested the F1 in Schools challenge. The challenge involves designing and making a miniature F1 race car. The car is to be made from balsa wood and be powered only by a single gas cylinder containing 8 grams of pressurised CO<sub>2</sub>. It must be able to travel the 20-meter distance as quickly as possible, and withstand the forces of launch acceleration, track traversing and physical deceleration. In addition, its design and manufacture must adhere to detailed rules and regulations outlined in the Technical-Regulations for a cadet class competitor. To be prepared, you have decided to produce a design folio exemplar to be used when teaching the project. The folio is to demonstrate how to approach a design problem by following the design process. Your work must demonstrate an understanding and application of the design process, key concepts regarding aerodynamics, F1 in Schools technical rules and regulations, as well as sketching and CAD skills. All work is to be collated and presented in the form of a PowerPoint presentation. A template is provided for the Design Folio Exemplar. It is to be submitted online via the Moodle website in the following format:

Last name\_First name\_Design Folio

### **Assessment Due Date**

Week 12 Friday (11 Oct 2019) 11:55 pm AEST

### **Return Date to Students**

Exam Week Monday (21 Oct 2019)

### **Weighting**

50%

### **Assessment Criteria**

Students are assessed on the following criteria:

- Knowledge and understanding of design task
- Ability to express and develop an Idea
- Knowledge and application of CAD tools and processes
- Knowledge and application of Technical Rules and Regulations
- Application and evaluation of CFD testing
- Ability to present and communicate work effectively

### **Referencing Style**

- [American Psychological Association 6th Edition \(APA 6th edition\)](#)

### **Submission**

Online

### **Learning Outcomes Assessed**

- Plan and develop a STEM program based on a suite of design and construction activities.
- Apply skills sequences and procedures using CAD/CAM, virtual modelling techniques and appropriate discipline specific teaching techniques.
- Apply problem solving, planning, sequencing, implementing and assessing strategies to STEM applications and processes to promote STEM education including the application of innovation.
- Critically evaluate the design and manufacture of STEM teaching and production processes.
- Apply appropriate workplace health and safety and maintenance practices when engaging in design and manufacturing activities.

### **Graduate Attributes**

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- Information Technology Competence
- Cross Cultural Competence
- Ethical practice

## Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the [Student Academic Integrity Policy and Procedure](#). This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

### What is a breach of academic integrity?

A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

### Why is academic integrity important?

A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

### Where can I get assistance?

For academic advice and guidance, the [Academic Learning Centre \(ALC\)](#) can support you in becoming confident in completing assessments with integrity and of high standard.

### What can you do to act with integrity?



#### Be Honest

If your assessment task is done by someone else, it would be dishonest of you to claim it as your own



#### Seek Help

If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)



#### Produce Original Work

Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem